Generic Trading Service in Telecommunication Platforms

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Abstract. Telecommunication companies are currently defining a Telecommunications Information Networking Architecture (TINA) to meet the future demands of electronic markets. As part of such standardization efforts generic services are being defined. As well we demonstrate how a knowledge-based approach using conceptual graphs helps to develop a generic service for the mediation of services. The prototype of a knowledge-based trader is built according to the client/server paradigm which allows access to this service in a heterogeneous environment. This paper describes service mediation in general and the details of matching service offers and requests.

Keywords: TINA, RM-ODP, type system, interface definition language, trading.

1 Introduction

The constant growth of digital networks in telecommunication systems has opened up new opportunities with respect to the provision of new services. The telecommunication companies have an interest not only to transport data but to provide user-oriented end services over these digital networks. This results in the migration of classical services like yellow pages towards computer-supported services in the digital network. Telecommunication companies place high demands on the properties of the underlying infrastructure which are generally not met by the current Internet technology. Aspects like reliability, broadband communication, accounting and security require new technologies and new software distribution platforms.

Such demands require standardization of the underlying infrastructure in order to support interoperability in a world-wide heterogeneous network. Several institutions work on technology-independent standards which define frameworks for open distributed systems. For example, the International Organization for Standardization (ISO) and the International Telecommunication Union,
Telecommunication Standardization Sector (ITU-T) have developed the Reference Model for Open Distributed Processing (RM-ODP) (see [2]). The RM-ODP describes an architecture which supports the distribution, interoperability and portability of software components. The telecommunication companies have adopted the RM-ODP and refined it according to their specific needs. The resulting standardization effort is led by the Telecommunications Information Networking Architecture (TINA) Consortium; an international collaboration of telecommunication and IT companies aiming at defining and validating an open architecture for information and telecommunication services, which meets the future market requirements (see [1]). The TINA architecture is based on distributed computing and object orientation.

Generic services are of particular interest as they can be customized easily for different environments. The Deutsche Telekom AG is developing in co-operation with the University of Frankfurt, a prototype of a particular service: a generic trading service. In this novel approach we make use of conceptual graphs as a service type specification language. The structure of this paper is as follows: In Section 2 we first provide the necessary background of service trading and then show how conceptual graphs can be used for type specifications and the matching of service offers and requests. In Section 3 we show in more detail how the matching of conceptual graphs works. The current prototype of our knowledge-based trader is described next in Section 4. In Section 5 we present a conclusion and an outlook for future work.

2 Service Mediation in Open Service Markets

2.1 The RM-ODP model of service trading

The RM-ODP as well as TINA require the support of a trading function which assists in the search for services (see [3]). All participating parties in a telecommunication system assume the roles of service providers and service requesters, which have no a priori knowledge about each other. In particular, they are not linked statically to each other, but rather dynamically when they decide to participate in the open service market. During the mediation of services another party assumes the role of a trader, whose task is to match service offers and requests (see figure 1). According to the RM-ODP, a mediation process is divided into several steps. First a service provider exports its service offer to the trader (1). At a later point in time a service requester tries to import a particular service (2). If the trader finds a matching service offer, which has previously been exported, it responds a reference to the service requester pointing to the appropriate provider (3). After a successful mediation process the service requester and provider are bound to each other and start to interact (4). The trading of services as described by the RM-ODP easily scales up as one trader can delegate import operations to another trader.

The notion of a type system is essential for the discussion of a mediation process (see [8]). For one thing, a type system defines a type specification language,